REMARKS

Claims 38-41 are pending in the application.

Among other things, independent claim 38 has been amended to correct minor typographical errors, resulting from translation.

The replacement of "the reference clock" with "the frequency f_{d0}" in the last paragraph of claim 38 is supported by the disclosure on page 114, lines 23, 24, and page 116, lines 19-21 of the instant application. No new matter has been introduced.

REJECTION OF CLAIMS 38-41 UNDER 35 U.S.C. §112

Claims 38-41 are rejected under 35 U.S.C. §112, first paragraph, as based on a non-enabling disclosure. Applicants respectfully traverse the rejection for the following reasons.

The subject matter recited in claim 38 pertaining to the data-sequence synchronization circuit is disclosed in the instant application starting with the first full paragraph on page 114 and illustrated in FIG. 16 of the instant application. The Examiner is respectfully requested to refer to this disclosure, which fully supports the recited subject matter in claim 38 and, in particular, the claimed data-sequence synchronization circuit. Contrary to the Office Action, the circuitry as disclosed in paragraph 323 (page 85, second full paragraph) is neither critical nor essential to the practice of the invention according to the embodiment of claim 38. Consequently, Applicants respectfully request withdrawal of the rejection.

With respect to claim 39, rejected under 35 U.S.C. §112, second paragraph, it is stated in the Office Action that the formula recited is not clearly defined. Applicants regret a typographical error and amend claim 39 by replacing "AR" with "ΔR" to correct this error in order to conform to the recited formula. Hence, withdrawal of the rejection is respectfully requested.

OBJECTION TO CLAIM 39

Claim 39 is objected to because of the following informality: with respect to the reference signal generator and the ability of varying the clock signal T in a reverse proportion with respect to the radius, it is not clear as to what this is referring to, according to the Office Action. In response, it is respectfully submitted that the aim of varying the data reference clock T according to a radial position is to carry out recording with uniform linear density in CAV mode, as described on page 83, lines 10-17 of the instant application. More specifically, in the CAV recording, the linear velocity V becomes gradually higher from the inner tracks to the outer tracks. If the value VT is kept constant at any position along radial direction, the mark length nT is also made constant irrespective of the angular velocity of rotation. Hence, in order to keep the value VT constant, it is necessary to vary the data reference clock T in reverse proportion to the radius distance accordingly.

It is believed that the above claim limitation has been clarified, as requested in the Office Action, and it is fully supported in the instant application. Withdrawal of the objection is, therefore, respectfully requested.

REJECTION OF CLAIMS 38-41 UNDER 35 U.S.C. §103

Claims 38 and 41 are rejected under 35 U.S.C. §103 as being unpatentable over Eguchi et al. (either USP 6,473,377 or USP 6,292,458) in view of Ohta et al. (USP 6,246,649). Yoshimaru (USP 4,984,227) was also cited as another relevant prior art reference according to the Office Action.

Claim 39 is rejected under 35 U.S.C. §103 as being unpatentable over Eguchi in view of Ohta and further in view of either Naito (USP 5,463,604) or Miura et al (not listed in the form PTO-892).

Claim 40 is rejected under 35 U.S.C. §103 as being unpatentable over Eguchi in view of Ohta and further in view of Rabe (USP 4,763,053). Applicants respectfully traverse all rejections for the following reasons.

(i) Present Invention

The main objective of the present invention is to carry out precise recording when data are recorded at varying linear velocity (namely, when recording is carried out without using CLV mode).

To attain the objective, amended claim 38 recites the feature of **making fine adjustment of r.p.m. (revolutions per minute) of the disc in the CAV mode recording so as to satisfy a relation f_{d0}=N f_{A0} at any radius position, by comparing in phase between a reference signal f_{R0}, which is obtained by dividing the frequency f_{d0} at a particular radius by N (where N is an integer), and the carrier frequency f_{A0}, which is detected at the given address from the meandering groove geometry.**

Specifically, the RPM of an optical disc (namely, the RPM of the motor) is controlled in such a manner that the carrier frequency f_{A0} detected at each radius position and the reference clock frequency f_{d0} meet the relation expressed by f_{d0}=N f_{A0} with respect to any radius position of the optical disc (see page 113, line 22 – page 117, line 8 of the description and FIG. 16).

Since f_{R0}=(1/N)*f_{d0} (in Fig. 16, N=196), controlling the RPM in such a manner as to meet f_{d0}=N f_{A0} (f_{A0}=(1/N)*f_{d0}) leads straight to the relation expressed by f_{A0}= f_{R0}, which means that the carrier frequency f_{A0} detected at each radius position on the optical disc should be controlled so as to be equal to the value f_{R0}, which represents the theoretical (calculated) value of carrier frequency for ideally carrying out recording in CAV mode. Hence, when a difference arises between the detected carrier frequency f_{A0} and the carrier frequency f_{R0} being a reference, the

difference is fed back to the motor, and the RPM of the motor is precisely controlled so as to compensate for the difference.

Thus, the main inventive concept of the present invention is to provide a feedback mechanism (the circuit of "PHASE CONTROLLER PCO" → "VCO2" → "SPINDLE MOTOR M1" in FIG. 16) for precisely controlling the RPM of the motor in a recording mode where recording is made with varying linear velocity according to the radius position, such as CAV mode. With this arrangement, it becomes possible to carry out the CAV recording with higher precision (namely, to carry out recording with constant linear density and ensure compatibility with a CLV mode).

(ii) Eguchi (USP 6,292,458)

The Office Action refers to FIG. 8 and column 5, line 50 – column 6, line 48 of Eguchi (USP 6,292,458). However, the part referred to in the Office Action is not related to a method of recording on an optical disc using an optical record carrier 1_{LS}, but related to a method of manufacturing the optical record carrier 1_{LS}, which is explicitly described in column 5, lines 50-55.

There is some reference to a recording method in the section starting from column 8, line 29 of Eguchi, in which section the part of column 9, lines 9-20 describes specifically the CAV-mode recording. According to the description of Eguchi, a CAV-based apparatus is realized from a CLV-based apparatus by eliminating the connection between an address reader 85 and a CLV reference signal generator 87 and replacing the CLV reference signal generator 87 with a CAV reference signal generator, which causes the optical record carrier 1_{LS} to revolve at CAV. This translates into that the optical record carrier 1_{LS} is caused to revolve by each of the CAV reference signal generator, a motor controller 88 and a spindle motor 89 individually.

Consequently, Eguchi fails to disclose or suggest the feature of detecting a deviation of the detected carrier frequency f_{AO} from the reference carrier frequency f_{RO} and controlling the motor so as to compensate for the deviation. Eguchi is therefore totally silent about the subject matter of the present invention as recited in claim 38.

(iii) Ohta (USP 6,246,649)

Ohta relates to a method of reproducing data from an optical disc driven by CAV method. According to FIG. 1, Fig. 4 and column 8, lines 45-59 of Ohta, in carrying out the CAV recording, a control microcomputer 21 judges the center frequency of a wobble signal detected based on the relative linear velocity at each radial position of an optical disc, and changes the setting of each circuit of an ATIP demodulator 20 such that a modified component of the wobble signal of the carrier frequency can be detected. Specifically, the ATIP demodulator 20 is provided with a phase comparator 61 for comparing a wobble signal detected from the optical disc with a set frequency signal (column 7, lines 14-25). This arrangement enables the demodulation of a wobble signal, which has been recorded on the optical disc during the CAV mode (column 9, lines 8-15).

However, although the phase comparator 61 is provided for comparing the wobble signal with the set frequency signal, it is independent of any one of a frequency generator (FG) 16, a spindle servo circuit 40 and a spindle motor 18 (as is evident from FIG. 1), so that the spindle motor 18 does not receive any feedback from the phase comparator 61.

Consequently, Ohta fails to disclose or suggest any concept of feeding back a difference detected by the phase comparator 61 to the spindle motor 18 to control the RPM of the spindle motor 18 therewith. Ohta is therefore totally silent about the subject matter of the present invention as recited in claim 38.

(iv) Combination of Eguchi and Ohta

As explained above in (ii) and (iii), Eguchi and Ohta each fails to disclose or suggest the concept of detecting a difference between the detected carrier frequency f_{AO} and the reference carrier frequency f_{RO} during the CAV recording and controlling the motor so as to compensate for the difference: in the absence of a considerable reconstruction to at least either of the cited references, any expert skilled in the art would not reach the subject matter recited in amended claim 38.

It is supposed that Eguchi and Ohta fail to touch the above-mentioned concept for the following reason.

Once advantage of the CAV recording is in that it enables to revolve an optical disc at a constant angular velocity (at a constant RPM) as compared with the CLV recording, in which it is necessary to vary the RPM of the disc according to the radius position of the disc so that the linear velocity becomes uniform at each of the tracks (namely, it is necessary to adjust the RPM slower as the recording is made on the outer tracks).

The CAV recording hence does not require such a complicated control as is required by the CLV recording. On this account, it has conventionally been considered that the CAV recording is in no need of complex control of the motor. It is therefore assumed that neither Eguchi nor Ohta recognized any necessity to feed back a difference between the detected carrier frequency f_{AO} and the reference carrier frequency f_{RO} to the motor.

Contrarily, the present inventors found that it is necessary to control the RPM of the motor in accordance with the difference between the detected carrier frequency f_{AO} and the reference carrier frequency f_{RO} in order to achieve precise recording in such a recording method

as the CAV recording, in which data are recorded at varying linear velocity in accordance to radial position.

Accordingly, Applicants respectfully submit that independent claim 38 is not rendered obvious by Eguchi and Ohta, and is thereby allowable. As claim 41 depends from allowable claim 38, Applicants respectfully submit that claim 41 is also allowable for at least this reason.

(v) Yoshimaru (USP 4,984,227)

The Examiner contends that Yoshimaru pertains to varying the clock frequency in accordance to radial position so as to permit constant linear density recording/reproducing.

However, Yoshimaru fails to disclose or suggest the concept of detecting a difference between the carrier frequency f_{A0} and the reference carrier frequency f_{R0} and controlling the motor so as to compensate for the difference, as explained herein.

Yoshimaru mentions two different modes of CAV recording: one is disclosed in column 2, line 17 – column 5, line 38, and the other in column 5, line 39 – column 7, line 13 and FIG. 4.

With regard to the first mode, FIG. 1 of Yoshimaru shows a PPL motor driver 17 and a motor 3 independently of other components (this arrangement is similar to that shown in Fig. 1 of Ohta), indicating that the difference between the carrier frequency f_{A0} and the reference carrier frequency f_{R0} is not fed back to the PPL motor driver 17, and that the PPL motor driver 17 is not controlled so as to compensate for the difference.

Concerning the second mode, it is stated in column 5, lines 45-59 that a programmable counter 26, responsive to a signal input from a CPU 15 for signifying RPM (900 rpm, 600 rpm), outputs a signal for switching between the binary mode and the ternary mode toward the PPL motor driver 17 to thereby change the RPM of the motor 3: the RPM of the motor 3 is changed in a predetermined manner in response to the signal from the CPU 15. It is therefore apparent that

also in this mode, the difference between the detected carrier frequency f_{AO} and the reference carrier frequency f_{RO} is not fed back to the PPL motor driver 17, and that the PPL motor driver 17 is not controlled so as to compensate for the difference.

(vi) Rabe (USP 4,763,053)

Claim 40 depends from allowable claim 38. As stated above, the combination of Eguchi and Ohta fails to disclose all the features of the present invention as recited in independent claim 38. Rabe is relied upon only for the proposition of having motors within 1/1000 of the rated speed. Even if, for the sake of argument, it is assumed that Rabe teaches this feature, Rabe still does not disclose any other element of the optical disc recording/retrieving apparatus as recited in claim 38. Thus, this patent fails to supplement Eguchi and Ohta to cure their deficiencies. For this reason, the combination of Eguchi, Ohta and Rabe does not render obvious the present invention as recited in claim 40.

(vii) Naito (USP 5,463,604) and Miura

Claim 39 depends from allowable claim 38. As stated above, the combination of Eguchi and Ohta fails to disclose all the features of the present invention as recited in independent claim 38. Naito is relied upon only for the proposition of teaching an alternative expression of frequencies to Applicants' relationship. Even if, for the sake of argument, it is assumed that Naito teaches this feature, Naito still does not disclose any other element of the optical disc recording/retrieving apparatus as recited in claim 38. Thus, this patent fails to supplement Eguchi and Ohta to cure their deficiencies. For this reason, the combination of Eguchi, Ohta and Naito does not render obvious the present invention as recited in claim 39.

With respect to Miura, its patent number was omitted from the form PTO-892. Thus, no analysis of this reference could be provided by Applicants.

CONCLUSION

An earnest effort has been made to be fully responsive to the Examiner's rejections. In view of the above amendments and remarks, it is believed that the present application is in condition for allowance. Passage of this application to allowance is earnestly solicited. However, if for any reason the Examiner should consider this application not to be in condition for allowance, he is respectfully requested to telephone the undersigned attorney at the number listed below prior to issuing a further Action.

The Examiner is requested to provide a new form PTO-892 to correct U.S. Patent Document A (incorrect number) and provide the patent number for Miura relied upon in the Office Action.

We respectfully request that all fees relating to this application be charged to Deposit Acct. No. 50-1290.

Respectfully submitted,

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